GIAN Course on "Energy Efficient Hardware Security Using Post-CMOS Nanodevices for Mobile Computing"

March 25-29, 2023

Organized by Department of Electronics and Communication Engineering, IIT Roorkee, Uttarakhand, India

An Initiative of Ministry of Education

शिक्षा मंत्रालय
MINISTRY OF EDUCATION
सत्यमेव जयते

Overview

The security issues in the current-world computer systems are not only limited to software and data threats, but hardware-based security has also become a major concern. Resource-constrained internet of things (IoT) and mobile computing have an intense need for secure hardware systems to address complex security threats. Research suggests that hardware-based security is a key to achieve reliable communication, privacy protection, and data encryption in IoT and mobile computing. Hardware solutions like physically unclonable functions (PUFs), hardware encryption, and true random number generators (TRNGs) have displayed excellent ability to tackle emerging security issues. They show a great promise to identify and resolve security threats such as chip cloning, Trojan insertion, IC recycling, and side-channel attacks. However, conventional CMOS-based hardware security circuits offer limited randomness and entropy along with other drawbacks like high sensitivity to environmental perturbations, area, and power overhead. Emerging logic devices such as symmetric FET, silicon nanowire FET, and non-volatile memories (NVMs) like spin-transfer-torque-magneto resistive RAM (STT-MRAM) and resistive RAM are good candidates to implement hardware security solutions. These devices offer inherent entropy sources to realize hardware security solutions with reduced area and power overhead for mobile computing and IoT. This course will provide an in-depth treatment of CMOS and post-CMOS-enabled hardware security primitives and their security implications.

Objectives

The primary objectives of the course are as follows:

❖ To provide the participants the basic concept of hardware security primitives and solutions, existing security challenges in IoT, and mobile computing.

❖ To offer insight into emerging memory device technologies.

❖ To provide participants an understanding of the application of post-CMOS Nano-devices (resistive and spintronic devices) for hardware security solutions.

❖ To provide exposure to practical problems on hardware security and their solutions through case studies and application of certain tools.

You Should Attend If

❖ you are a student (BTech/MSc/MTech/PhD) or faculty from a reputed academic and technical institution doing research in the field of emerging memory devices/circuits and hardware security.

❖ you are an executive, engineer, or researcher from manufacturing, service, and government organization including R&D laboratories interested in devices and circuits for hardware security applications.

Course Modules

❖ Introduction to post-CMOS devices and circuits
❖ Post-CMOS devices based hardware security and privacy
❖ Security primitives using resistive and spintronic devices
❖ In memory acceleration of security engines
❖ Quantum computing
❖ Quantum true random number generators
❖ Physically unclonable functions

Note: Number of participants for the course will be limited to 100

Course Instructor

Dr. Swaroop Ghosh is an Associate Professor at Pennsylvania State University. His research areas include emerging memory technologies, hardware security, quantum computing and digital testing.

Course Co-ordinator

Dr. Brajesh Kumar Kaushik is a Professor in the Department of Electronics and Communication Engineering at Indian Institute of Technology, Roorkee. His research areas include spintronic devices, circuits, and systems, in-memory computing, and quantum computing.

How to apply?

This course will be conducted through **on-line mode**. The candidates will be intimated through email for joining the live webcast. Candidates can register themselves by following the instructions provided on the link: https://tinyurl.com/4kwf5n3r Candidates can also scan the following QR code for the registration instructions:

Last date to register: March 22, 2023

Course Registration Fees

Academic Institutions (Students): INR 1000
Academic Institutions (Faculty): INR 1500
Industry/ Research Organizations: INR 2500
Participants from abroad : US $125

The above fee includes all instructional materials and computer and software use for tutorials.

For any query, contact Course Coordinator at:
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